



## PATENT ABSTRACTS OF JAPAN

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## (54) PATTERN FORMING METHOD AND EXPOSURE APPARATUS THEREFOR

## (57) Abstract:

**PURPOSE:** To improve resolution by forming a projection optical system of an optical system having a reflection type lens, and fully filling entirely or part of an optical path of the projection system included between a surface of a board and the projection system with medium having 1 or more of specific refractive index to the air in the wavelength of a light.

**CONSTITUTION:** A beam 12 generated from a KrF excimer laser 11 is emitted to a mask 3 via a beam shaping optical system 13 and an illumination optical system 2. A light passing through the mask 3 is exposed on a board 5 via a reflection type contraction projection lens 7. The lens 7 is a Schwarzschild type optical system having a numerical aperture of 0.3 to focus the mask 3 on the board 5. The entire system from the irradiating side of the illumination system to

the board via the mask is installed in a liquid vessel 14, and water is fully filled in the vessel to fill the water in the optical path. Then, a pattern is transferred to a positive resist film coating the Si board by using a projection exposure apparatus to form a  $0.35\mu\text{m}/\text{S}$  pattern.

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